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Heat exchanger matrix assembly prodn. for brazing - using feed tube to hold fins and tubes in position

D/S: E(DT, FR, GB, IT).

The heat exchanger matrix assembly includes a pack of fins and tubes which are retained in an assembled state by a feed tube that passes through apertures in the tubes. Abutments on each side of the matrix prevent its disassembly and facilitate a subsequent brazing operation.

USES

Prodn. of a heat exchanger of packed construction type, e.g. a matrix assembly for an Al oil-cooler for a motor vehicle.

ADVANTAGES

The abutments are provided adjacent to side casings of the assembly to retain the matrix in an assembled state and enable handling without a jig prior to brazing.

EMBODIMENT

A heat exchanger of packed construction type has a matrix comprising a pack of fins and tubes arranged in alternate layers. Each tube is made up of upper and lower pressings (14) (15) which are to be brazed together. Apertures are provided at both ends of the tubes to receive feed tubes (16). Side casings (17) (18) are disposed at the sides of the matrix. Side casing (17) is secured in position between an annular swaged portion (20) and a feed fitting (19). The other side casing (18) is held in place by an annular swaged portion (21) on the feed tube. Domed capping members (22) close off the end of each feed tube. When the matrix is assembled it is subjected to a compressive loading and the various swaging operations. The assembly is then brazed with the matrix subjected to compression to effect closing up of the elements as the brazing metal on their surfaces melts. (10pp1044)

(E)ISR: DS-917404; GB1076140; US2394831; US2794243.

M(23-A).

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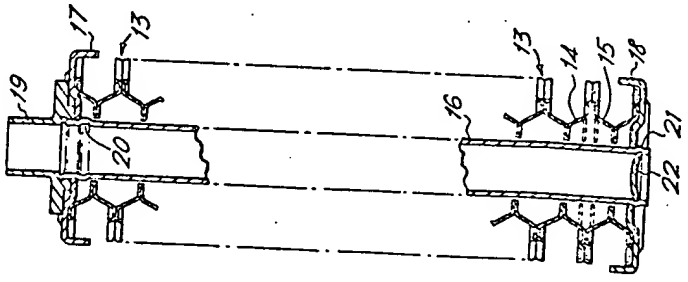
clamping device to facilitate brazing



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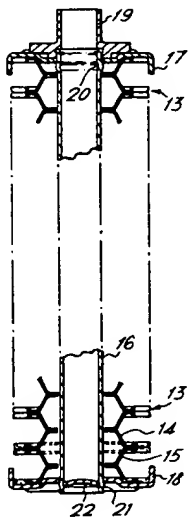
(54) Improvements relating to heat exchangers.

(57) A heat exchanger comprises a matrix of packed construction having fins (12) and tubes (13) arranged in alternate layers, bounded by side casings (17, 18). Feed tubes (16) which pass through the matrix at either end are provided with abutments (19, 21) adjacent to the side casings after assembly to retain the matrix in an assembled state to enable handling without a jig prior to brazing.



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Improvements Relating to Heat Exchangers

This invention relates to heat exchangers and in particular to heat exchangers of the packed construction type. Generally in such heat exchangers corrugated fins are sandwiched between flat-section tubes to define airways between the tubes.

Hitherto such heat exchangers have commonly been assembled in a combined assembly and brazing jig, and have included a pair of side casings and a pair of end casings which enclose the packed construction matrix. Under some circumstances it has been preferred to render the heat exchangers self-jigging so that whilst assembly may still take place in a jig the heat exchanger can be removed from the assembly jig without risk of disintegration and then brazed in a fixture. This self-jigging feature has generally been achieved by applying a compression load to the assembled heat exchanger and connecting the side and end casings together so as to avoid subsequent expansion of the assembly when the compression load is removed.

According to the present invention a method of producing a heat exchanger matrix assembly for subsequent brazing includes the step of retaining a pack of fins and tubes in an assembled state by a feed tube that passes through apertures in the tubes and has an abutment at each side of the matrix to prevent disassembly thereof.

The feed tube may be inserted through said apertures after the matrix has been assembled, or alternatively the matrix may be assembled onto the feed tube, placing each of the tubes in turn over one end of the feed tube as the matrix is built up prior to the provision of that feed tube end with its abutment.

Generally two feed tubes are provided, one at each end of the heat exchanger, thereby rendering further securing means unnecessary prior to brazing.

Preferably the method includes the step of expanding an end portion of the feed tube after assembly of the heat exchanger matrix. The feed tube end portion may for example be expanded by swaging or by belling the tube end.

Preferably the method includes the step of locating a pair of side casings one on each side of the matrix and secured thereto prior to brazing by the feed tube which passes through apertures in the side casings.

Although under many circumstances the method according to the invention will enable the end casings of the prior art to be omitted for simplicity, cheapness and light weight, it is of course possible to include the step of providing a pair of end casings for greater rigidity or particular mounting requirements.

The invention extends to a heat exchanger matrix assembly for subsequent brazing, including a pack of fins and tubes which are retained in an assembled state by a feed tube that passes through apertures in the tubes and that has an abutment at each side of the matrix to prevent disassembly thereof.

Figure 1 shows a heat exchanger matrix assembly of packed construction prior to brazing; and

Figure 2 is a cross sectional side view of the heat exchanger of Figure 1 taken along the line II-II.

In Figure 1 there is shown a matrix assembly for an aluminium oil-cooler 11 for a motor vehicle. The oil cooler is of packed construction and has a matrix comprising a pack of fins 12 and tubes 13 arranged in alternate layers. As shown in Figure 2, each of the tubes 13 is made up of an upper pressing 14 and a lower pressing 15 which are to be brazed together.

At both ends of the tubes 13 there are apertures disposed in header portions of the tubes, through which pass feed tubes 16. The feed tubes are themselves provided with apertures (not shown) which allow oil to flow from one feed tube to the other by way of tubes 13.

At the sides of the matrix are disposed side casings 17 and 18, respectively. Side casing 17 is secured to each of the feed tubes between an inlet and outlet fitting 19 swaged to the end portion of the feed tube, and an annular swaged portion 20. Side casing 18 is held in place between the matrix and an annular swaged portion 21 on the feed tube. A domed capping member 22 is fitted in the hollow of swaged portion 21 to close the end of each feed tube.

The arrangement shown may be assembled in different ways. A first method of assembly is to assemble first the fins 12 and tubes 13 in an assembly jig along with the side casings. The feed tubes are then slid through the apertures in the tubes 13 and the side casings and, with the matrix assembly subjected to a compressive loading, the various swaging operations are performed. A second method involves assembling the fins, tubes and side casings onto the feed tubes in an assembly jig, the swaging operations then being performed as above.

With the arrangement thus assembled it can be removed from the assembly jig without risk of disassembly and may be passed on for brazing. The need to provide a combined assembly and brazing jig is thus avoided. The assembly is then brazed with the matrix again subjected to a compressive loading, to effect a closing up of the elements as the brazing metal on their surfaces melts.

The closing up of the elements results in side casing 18 moving along the feed tubes from swaged portions 21 until the matrix is fully closed up, when the casing becomes brazed in position.

It will be understood that although in the present embodiment swaging has been used to provide the necessary abutments on the feed tubes to prevent disassembly of the matrix, other forms of abutment could be used. For example other methods could be used for expanding the end portion 21; indeed, the abutment could even take the form of a cap over the lower end of the feed tube which would also serve the purpose of closing the end of the tube.

Again the inlet and outlet fitting 19 is by no means essential - some form of abutment only being necessary. It will be clear that the abutment at one end of each feed tube could be provided prior to assembly of the heat exchanger.

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Claims

1. A method of producing a heat exchanger matrix assembly for subsequent brazing characterised by the step of retaining a pack of fins (12) and tubes (13) in an assembled state by a feed tube (16) that passes through apertures in the tubes and has an abutment (19,21) at each side of the matrix to prevent disassembly thereof.

2. A method as claimed in claim 1, characterised in that at least one of the said abutments (21) is produced by radially expanding the feed tube (16).

3. A method as claimed in claim 2, characterised in that the feed tube (16) is expanded by swaging.

4. A method as claimed in claim 1, 2 or 3, characterised in that at least one of said abutments (19) comprises an element attached to the feed tube (16).

5. A method as claimed in any preceding claim, characterised in that the matrix is compressed in a direction parallel to the feed tube (16) prior to providing at least one of said abutments (19,21).

6. A method as claimed in any preceding claim, characterised in that one of the said abutments (19,21) is provided prior to assembly of the feed tube (16) with the pack of fins (12) and tubes (13).

7. A method as claimed in any preceding claim, characterised in that, after assembly, the matrix (12,13) is subjected to compressive loading and brazed.

8. A method as claimed in any preceding claim, characterised in that the feed tube (16) is inserted through the apertures after the matrix (12,13) has been assembled.

9. A method as claimed in any one of the claims 1 to 7, characterised in that the matrix (12,13) is assembled onto the feed tube (16).

10. A method as claimed in any preceding claim, characterised by the step of locating a pair of side casings (17) one on each side of the matrix (12,13) and securing the side casings in place by means of said abutments prior to brazing.

11. A heat exchanger characterised by having been constructed in accordance with the method of any one of claims 1 to 10.

12. A heat exchanger matrix assembly for subsequent brazing, including a pack of fins and tubes characterised in that said fins (12) and said tubes(13) are retained in an assembled state by a feed tube (16) that passes through apertures in the tubes (13) and that has an abutment (19,21) each side of the matrix to prevent disassembly thereof.

European Patent Office

EUROPEAN SEARCH REPORT

0013800
Application number
EP 79 30 2251

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
	DE - C - 917 404 (LICENTIA) * Page 2, lines 29-70 *	1,4-12
	GB - A - 1 076 140 (VOLKSWAGEN) * Page 1, line 46 to page 2, line 128 *	1,4,5,7-12
	US - A - 2 394 831 (WOODS) * Page 1, left-hand column, line 37 to page 2, left-hand column, line 38 *	1
A	US - A - 2 794 243 (SCHWELLER) * Column 1, line 45 to column 2, line 53 *	1

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

B 23 K 1/12
B 21 D 53/08

TECHNICAL FIELDS SEARCHED (Int.Cl.³)

B 23 K 1/12.
B 21 D 53/08
F 28 D 1/02
1/04

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11-04-1980	BERTIN

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FIG.1.

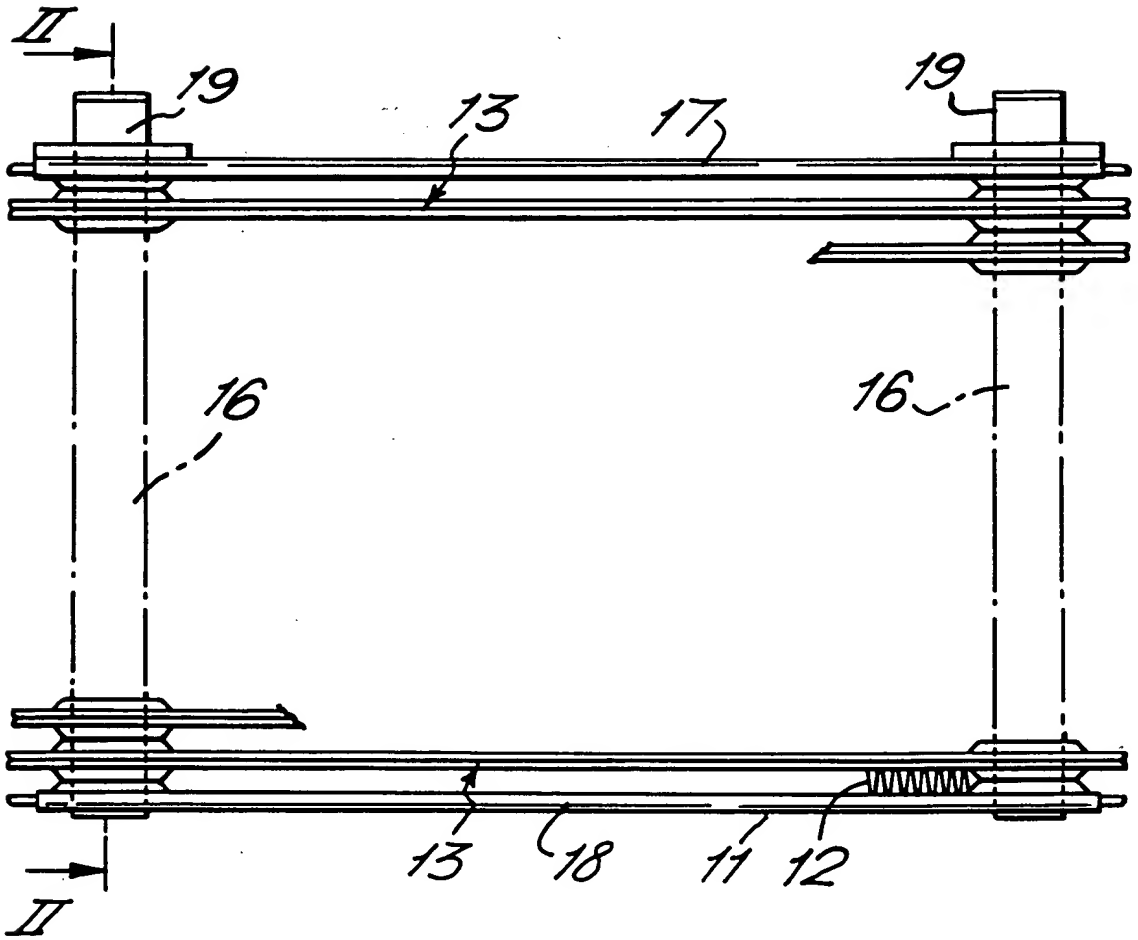

FIG.2.